

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference 589145C:JFM:NMV | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416). | |
| International Application No. PCT/AU2003/000417 | International Filing Date (day/month/year) 7 April 2003 | Priority Date (day/month/year) 5 April 2002 |
| International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ C01F 5/24, C01B 31/24, A61K 33/10 | | |
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- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70:16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheet(s).

- This report contains indications relating to the following items:

- | | |
|------|---|
| I | <input checked="" type="checkbox"/> Basis of the report |
| II | <input type="checkbox"/> Priority |
| III | <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| IV | <input type="checkbox"/> Lack of unity of invention |
| V | <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI | <input type="checkbox"/> Certain documents cited |
| VII | <input type="checkbox"/> Certain defects in the international application |
| VIII | <input type="checkbox"/> Certain observations on the international application |

| | |
|---|---|
| Date of submission of the demand 0 October 2003 | Date of completion of the report 22 April 2004 |
| Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA e-mail address: pct@ipaaustralia.gov.au telex No. (02) 6285 3929 | Authorized Officer JAMES DZIEDZIC Telephone No. (02) 6283 2495 |

I. Basis of the report

1. With regard to the elements of the international application:*
- ☐ the international application as originally filed.
- ☒ the description, pages **1-31 and Abstract**, as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **32-37**, received on **7 April 2004** with the letter of **2 April 2004**
- ☒ the drawings, pages **1-4**, as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of
2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

*** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement.**1. Statement**

| | | |
|-------------------------------|-------------|-----|
| Novelty (N) | Claims 1-26 | YES |
| | Claims | NO |
| Inventive step (IS) | Claims 1-26 | YES |
| | Claims | NO |
| Industrial applicability (IA) | Claims 1-26 | YES |
| | Claims | NO |

2. Citations and explanations (Rule 70.7)Citation

D1. AU 1998/59340 B2

NOVELTY (N) & INVENTIVE STEP (IS) Claims 1-26

The prior art document D1 discloses a method of preparing an initially cloudy aqueous solution containing magnesium bicarbonate which upon allowing to stand for greater than 6 hours produces a clear solution. However, the prior art does not appear to suggest controlling the calcium ion concentration so as to limit the precipitation of calcium salts in solution. This feature defined in the claims of the current patent application appears to substantially eliminate the formation of an initially cloudy aqueous solution.

Therefore the claims 1-26 are considered to be novel and inventive in light of the prior art document D1.

The claims defining the invention are as follows:

1. A method of preparing a substantially clear aqueous solution containing magnesium bicarbonate, including the steps of:

- contacting, with species resulting from the dissolution of carbon dioxide in water, an aqueous suspension of magnesium carbonate, at suitable conditions of pressure and temperature, so as to obtain an aqueous solution of magnesium bicarbonate; and
- controlling the pH of the said solution so that, after reaction of the said species with the magnesium carbonate, the final pH falls within a range of from about 8,0 to about 8,8,

wherein the concentration of calcium compounds or ions in the water and any other ingredients used to prepare the aqueous solution is about equal to or lower than that whereby insoluble calcium species would result, thereby allowing a substantially clear aqueous solution to be prepared.

2. A method of preparing a substantially clear aqueous solution containing magnesium bicarbonate, including the step of contacting, with species resulting from the dissolution of carbon dioxide in water, an aqueous suspension of magnesium carbonate, at suitable conditions of pressure and temperature, so as to obtain an aqueous solution of magnesium bicarbonate and magnesium carbonate, said aqueous solution having a pH, after reaction of the said species with the magnesium carbonate, within a range of from about 8,0 to about 8,8, wherein the concentration of calcium compounds or ions in the water and any other ingredients used to prepare the aqueous solution is about equal to or lower than that whereby insoluble calcium species would result, thereby allowing a substantially clear aqueous solution to be prepared.

3. The method of claim 2 further comprising controlling the pH of the suspension.

4. A method of preparing a substantially clear aqueous solution containing magnesium bicarbonate, including the steps of:

- contacting, with species resulting from the dissolution of carbon dioxide in water, an aqueous suspension of magnesium carbonate, at suitable conditions of pressure and temperature, so as to obtain an aqueous solution of magnesium bicarbonate at a pH, after reaction of the said species with the magnesium carbonate, falling within a range of from about 8,0 to about 8,8; and

- agitating the suspension so as to keep in suspension a major portion of the magnesium carbonate until substantially all of the said magnesium carbonate has been converted to dissolved magnesium bicarbonate,

wherein the concentration of calcium compounds or ions in the water and any other ingredients used to prepare the aqueous solution is about equal to or lower than that whereby insoluble calcium species would result, thereby allowing a substantially clear aqueous solution to be prepared.

5 5. The method of claim 4 further comprising controlling the pH of the suspension.

10 6. The method of claim 4 further comprising controlling the temperature of the suspension between about 0°C and about 25°C.

7. The method of claim 4 further comprising bottling the said aqueous solution of magnesium bicarbonate.

15 8. The method of claim 4 further comprising bottling the said aqueous solution of magnesium bicarbonate at a pH within a range of from about 7.8 to about 9.

9. The method of claim 4 further comprising bottling the said aqueous solution of magnesium bicarbonate when the magnesium bicarbonate solution is clear, or when the turbidity of the magnesium bicarbonate solution is no more than a slight haze and the pH falls within the range of about pH 7.8 to about pH 9.0.

20 10. An apparatus suitable for preparing an aqueous solution of magnesium bicarbonate, comprising:

- means for contacting, with species resulting from the dissolution of carbon dioxide in water, a suspension of powdered magnesium carbonate in water so as to form an aqueous solution of magnesium bicarbonate; and

25 - means for controlling the pH of the solution between about 7 and about 9 by adjusting the amount of at least one of the said species and the said powdered magnesium carbonate that is contacted with the other.

11. An apparatus suitable for preparing an aqueous solution of magnesium bicarbonate, comprising:

30 - means for contacting, with species resulting from the dissolution of carbon dioxide in water, a suspension of powdered magnesium carbonate in water so as to form an aqueous solution of magnesium bicarbonate; and

- means for keeping in suspension a major portion of said powdered magnesium carbonate until substantially all of the suspended magnesium carbonate has been converted to dissolved magnesium bicarbonate.

12. The apparatus according to claim 11 further comprising means for controlling
5 the pH of the solution between about 7.8 and about 9.

13. The apparatus according to claim 11 further comprising means for bottling the solution of magnesium bicarbonate.

14. The apparatus according to claim 11 wherein the means for contacting further comprises means for dissolving carbon dioxide in the water or in the said suspension so as
10 to form a solution containing the said species.

15. The apparatus according to claim 14 wherein the means for dissolving carbon dioxide comprises a sparger comprising a fine mesh such as a stocking like mesh.

16. The apparatus according to claim 15 wherein the means for dissolving carbon dioxide further comprises a tube and a helical baffle locatable within the tube, means for
15 disposing the tube in a substantially vertical position, means for introducing carbon dioxide into a first end of the tube which, in use, is located below a second end of the tube, and means for introducing water or the said aqueous suspension of magnesium carbonate at either of the first end or the second end thereof, whereby carbon dioxide is allowed to bubble through the tube and to be intimately contacted with the water or said
20 aqueous suspension of magnesium carbonate.

17. The apparatus of claim 11 further comprising means for bottling the magnesium bicarbonate solution.

18. A method of preparing a substantially clear aqueous solution containing magnesium bicarbonate, including the steps of:

25 - contacting, with species resulting from the dissolution of carbon dioxide in water, an aqueous suspension of magnesium carbonate, at suitable conditions of pressure and temperature, so as to obtain an aqueous solution of magnesium bicarbonate at a pH, after reaction of the said species with the magnesium carbonate, falling within a range of from about 8,0 to about 8,8;

30 - controlling the pH of the said solution within the said range until substantially all of the said magnesium carbonate has been converted to dissolved magnesium bicarbonate; and

- bottling the said magnesium bicarbonate solution,

wherein the concentration of calcium compounds or ions in the water and any other ingredients used to prepare the aqueous solution is about equal to or lower than that whereby insoluble calcium species would result, thereby allowing a substantially clear aqueous solution to be prepared.

19. A method of preparing a substantially clear aqueous solution containing magnesium bicarbonate, including the steps of:

- contacting, with species resulting from the dissolution of carbon dioxide in water, an aqueous suspension of magnesium carbonate, at suitable conditions of pressure and temperature, so as to obtain an aqueous solution of magnesium bicarbonate at a pH, after reaction of the said species with the magnesium carbonate, falling within a range of from about 8,0 to about 8,8;

- agitating the suspension so as to keep in suspension a major portion of the magnesium carbonate until substantially all of the said magnesium carbonate has been converted to dissolved magnesium bicarbonate; and

- bottling the said aqueous magnesium bicarbonate solution,

wherein the concentration of calcium compounds or ions in the water and any other ingredients used to prepare the aqueous solution is about equal to or lower than that whereby insoluble calcium species would result, thereby allowing a substantially clear aqueous solution to be prepared.

20. An apparatus suitable for preparing an aqueous solution of magnesium bicarbonate, comprising:

- means for contacting, with species resulting from the dissolution of carbon dioxide in water, a suspension of powdered magnesium carbonate in water so as to form an aqueous solution of magnesium bicarbonate;

- means for controlling the pH of the solution between about 7 and about 9 by adjusting the amount of at least one of the said species and the said powdered magnesium carbonate that is contacted with the other; and

- means for bottling the said solution of magnesium bicarbonate.

21. An apparatus suitable for preparing an aqueous solution of magnesium bicarbonate, comprising:

- means for contacting, with species resulting from the dissolution of carbon dioxide in water, a suspension of powdered magnesium carbonate in water so as to form an aqueous solution of magnesium bicarbonate;

- means for keeping in suspension a major portion of said powdered magnesium carbonate until substantially all of the suspended magnesium carbonate has been converted to dissolved magnesium bicarbonate; and

- means for bottling said solution of magnesium bicarbonate.

5 22. A method for the manufacture of an aqueous solution comprising dissolved magnesium bicarbonate and dissolved magnesium carbonate, wherein the process includes the step of contacting an aqueous suspension of a source of magnesium cations with such an amount of a species resulting from the dissolution of carbon dioxide in water and having an initial pH below about 7 as is sufficient to result in the said aqueous
10 solution comprising dissolved magnesium bicarbonate and dissolved magnesium carbonate having a pH of from about 8 to about 8,9 and to be substantially clear, wherein the concentration of calcium compounds or ions in the water and any other ingredients used to prepare the aqueous solution is about equal to or lower than that whereby insoluble calcium species would result, thereby allowing a substantially clear aqueous
15 solution to be prepared.

23. A method for the manufacture of an aqueous solution comprising dissolved magnesium bicarbonate or dissolved magnesium bicarbonate and dissolved magnesium carbonate, wherein the process includes the step of: (i) contacting an aqueous suspension of a source of magnesium cations with bubbles of carbon dioxide gas, (ii) agitating the
20 contacted aqueous suspension, (iii) recontacting the agitated contacted aqueous suspension with bubbles of carbon dioxide gas, and (iv) repeating steps (i) to (iii) as required, to provide a pH in the aqueous solution of from about 8 to about 9, wherein the concentration of calcium compounds or ions in the water and any other ingredients used to prepare the aqueous solution is about equal to or lower than that whereby insoluble
25 calcium species would result, thereby allowing a substantially clear aqueous solution to be prepared.

24. The method according to claim 1 further including sterilising the water and the suspension.

25. The method according to any one of claims 1 to 9, 18, 19, or 22 to 24,
30 wherein the concentration of calcium compounds or ions in the water is reduced by creating conditions favouring the precipitation of calcium carbonate and by the removal of such precipitated calcium carbonate from the solution.

26. An apparatus for the manufacture of an aqueous solution comprising dissolved magnesium bicarbonate and dissolved magnesium carbonate, the apparatus comprising means for contacting an aqueous suspension of a source of magnesium cations with such an amount of a species resulting from the dissolution of carbon dioxide
5 in water and having an initial pH below about 7 as is sufficient to result in the said aqueous solution comprising dissolved magnesium bicarbonate and dissolved magnesium carbonate having a pH of from about 7.5 to about 8,9 and to be substantially clear.

Dated 2 April, 2004

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